

10/019871

COFC

CHARLES B. GORDON
 THOMAS P. SCHILLER
 DAVID B. DEIOMA
 JOSEPH J. CORSO
 HOWARD G. SHIMOLA
 JEFFREY J. SOPKO
 JOHN P. MURTAUGH
 JAMES M. MOORE
 MICHAEL W. GARVEY
 RICHARD A. SHARPE
 RONALD M. KACHMARIK
 PAUL A. SERBINOWSKI
 BRIAN G. BEMBENICK
 AARON A. FISHMAN



PEARNE & GORDON LLP

ATTORNEYS AT LAW

1801 EAST 9th STREET

SUITE 1200

CLEVELAND, OHIO 44114-3108

TEL: +1 (216) 579-1700 FAX: +1 (216) 579-6073

EMAIL: ip@pearnegordon.com

STEPHEN S. WENTSLER
 ROBERT F. BODI
 SUZANNE B. GAGNON
 UNA L. LAURICIA
 STEVEN J. SOLOMON
 GREGORY D. FERNENGEL
 BRYAN M. GALLO
 BRAD C. SPENCER
OF COUNSEL
 LOWELL L. HEINKE
 THADDEUS A. ZALENSKI
PATENT AGENT
 TOMOKO ISHIHARA
 PATENT, TRADEMARK,
 COPYRIGHT AND RELATED
 INTELLECTUAL PROPERTY LAW

September 26, 2006

Commissioner for Patents
 P.O. Box 1450
 Alexandria, VA 22313-1450

Re: U.S. Patent No. 7,092,562
 Issued: August 15, 2006
 Inventor: Marc Viala et al.
 Our Docket No.: 34191

Certificate
 OCT 03 2006
of Correction

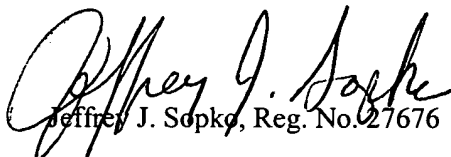
Sir:

A Certificate of Correction under 35 U.S.C. 254 is hereby requested to correct Patent Office printing errors in the above-identified patent. Enclosed herewith is a proposed Certificate of Correction (Form No. PTO-1050) and documentation in support of the proposed corrections for consideration.

It is requested that the Certificate of Correction be completed and mailed at an early date to the undersigned attorney of record. The proposed corrections are obvious ones and do not in any way change the sense of the application.

We understand that a check is not required since the errors were on the part of the Patent and Trademark Office in printing the patent.

Very truly yours,


 Jeffrey J. Sopko, Reg. No. 27676

JJS:ljw

Enclosures


I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

Jeffrey J. Sopko

Name of Attorney for Applicant(s)

9/26/06

Date


 Signature of Attorney

OCT - 3 2006

**UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION**

PATENT NO. : 7,092,562 B2
DATED : August 15, 2006
INVENTOR(S) : Viala et al.

PAGE 1 OF 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In Column 9, Line 20, please delete the “)” at the end of the equation after “Q”

In Column 11, Line 25, please delete the following equation:

$$z_k = (u_1^1, v_1^1, \theta_1^1, u_2^1, v_2^1, \theta_2^1, u_1^r, v_1^r, \theta_2^r x, y, z, \beta \phi r)^t."$$

And insert this equation in its place:

$$- - z_k = (u_1^1, v_1^1, \theta_1^1, u_2^1, v_2^1, \theta_2^1, u_1^r, v_1^r, \theta_1^r, u_2^r, v_2^r, \theta_2^r x, y, z, \beta \phi r)^t. - -$$

MAILING ADDRESS OF SENDER:

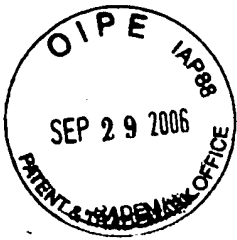
Jeffrey J. Sopko
Pearne & Gordon LLP
1801 East 9th Street
Suite 1200
Cleveland, Ohio 44114-3108

PATENT NO. 7,092,562 B2

No. of additional copies

⇒ 0

OCT - 3 2006



in other words the values $\chi_k, \beta_k, \alpha_k, t_{xk}, t_{yk}, t_{zk}$ that give the best agreement between the representation of the environment and its image on the cameras (h close to 0) for all dots j in the model. The following

5 equations are then solved recurrently:

$$(37) \quad h_p(x_k, z_k) = 0, \quad h_d(x_k, z_k) = 0, \quad h_{cy}(x_k, z_k) = 0, \\ \text{or } h_c(x_k, z_k) = 0$$

(one for each object already built, depending on the category of the object), in which observation vectors

10 z_k are given by the appropriate formula

$$(38) \quad z_k = (u^1, v^1, u^r, v^r, x, y, z,)^t, \\ z_k = (u^1, v^1, \theta^1, u^r, v^r, \theta^r, x, y, z, \beta, \varphi)^t, \\ z_k = (u_1^1, v_1^1, \theta_1^1, u_2^1, v_2^1, \theta_2^1, u_1^r, v_1^r, \theta_1^r, u_2^r, v_2^r, \theta_2^r, x, y, z, \beta, \varphi, r)^t. \\ \text{or } z_k = (u^1, v^1, l_1^1, l_2^1, \theta^1, u^r, v^r, l_1^r, l_2^r, \theta^r, x, y, z, \beta, \varphi, r)^t$$

15 this is another application of the Kalman filter in which the estimated state vector in this case is $(\chi_k, \beta_k, \alpha_k, t_{xk}, t_{yk}, t_{zk})$. Module 22 performs this positioning.

The identification module 23 of the system
20 automatically identifies at least some of the contours defined in the previous calculations, each time that an image is taken. It is proposed to proceed as follows:

- select a previous image k_0 , preferably close to the current image k concerning positions and
25 orientations of the photo;
- select points of interest I_0 on this previous image k_0 , which can be done automatically, the points of interest having the general property that the brightness gradient close to them is
30 high, and is not usually sensitive to changes in

orientations of the two observed limbs and the following measurement equation is obtained:

$$(19) \quad k_{cy}^i(x_k, z_k^i) = \begin{pmatrix} (m_{11} - m_{p1})xv_{11} \\ v_{11} \cdot (m_1 x v_1) \\ (m_{12} - m_{p2})xv_{12} \\ v_{12} \cdot (m_2 x v_2) \end{pmatrix} = 0$$

Figure 8 shows these parameters. v_{11} and m_{11} , v_{12} and m_{12} are deduced from z_k , as in the case of the straight line.

The circle is defined by a state vector conform with the following formula:

$$(20) \quad x_k = (x, y, z, \beta, \phi, r)^T,$$

where x , y and z denote the coordinates of its center, β and ϕ the spherical coordinates of the unit vector along its normal and r is its radius. Furthermore, the formulas

$$(21) \quad m_k = R_k^i m + t_k^i \quad \text{and} \quad v_k = R_k^i v$$

are applicable. If observation coordinates are represented by the function

$$(22) \quad z_k^i = (u, v, l_1, l_2, \theta),$$

the following equations

$$(23) \quad h_c^i(x_k, z_k^i) = \begin{pmatrix} q_0 - ((b^2(x_k^2 + y_k^2 + z_k^2 - r^2) + 1 - 2by_k)/Q) \\ q_1 - ((2ab(x_k^2 + y_k^2 + z_k^2 - r^2) - 2bx_k - 2ay_k)/Q) \\ q_2 - ((2ac(x_k^2 + y_k^2 + z_k^2 - r^2) - 2cx_k - 2az_k)/Q) \\ q_3 - ((2bc(x_k^2 + y_k^2 + z_k^2 - r^2) - 2cy_k - 2bz_k)/Q) \\ q_4 - ((c^2(x_k^2 + y_k^2 + z_k^2 - r^2) + 1 - 2cz_k)/Q) \end{pmatrix} = 0$$

where $Q = a^2(x_k^2 + y_k^2 + z_k^2 - r^2) + 1 - 2bx_k$ express the transfer between the state vector and observations, in which q_0, \dots, q_4 are derived from conversion of parameters (22)